

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-341/85052(DRS)

Docket No. 50-341

License No. NPF-43

Licensee: Detroit Edison Company
2000 Second Avenue
Detroit, MI 48224

Facility Name: Fermi Nuclear Power Plant, Unit 2

Inspection At: Fermi 2 Site, Monroe, MI and
Stone and Webster Engineering Office, Cherry Hill, NJ

Inspection Conducted: December 2-5, 17, 1985, and January 13-16, 21-23,
February 4-6, and March 13, 1986

Inspectors:

P. D. Kaufman
P. D. Kaufman

4/7/86.
Date

J. W. Muffett
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4/7/86.
Date

J. F. Schapker
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4/7/86
Date

Approved By:

D. H. Danielson
D. H. Danielson, Chief
Materials Processes Section

4/7/86
Date

Inspection Summary

Inspection on December 2-5, 17, 1985, and January 13-16, 21-23, February 4-6, and March 13, 1986 (Report No. 50-341/85052(DRS))

Areas Inspected: Special announced safety inspection of the licensee's Nuclear Engineering design change documents issued without evidence of a seismic review, and followup on potentially overloaded embedment plates (LER No. 85-082-00).

Results: Of the areas inspected, one violation was identified (failure to adequately control design activities - Paragraph 4.a). One unresolved item (Paragraph 4.c) was identified.

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DETAILS

1. Persons Contacted

Detroit Edison Company (DECo)

- F. Agosti, Manager, Nuclear Operations
- A. Colandrea, Principal Engineer, Civil
- °*J. Conen, Licensing Engineer
- P. A. Marquardt, General Attorney
- L. Schuerman, General Supervisor, Engineering
- G. Overbeck, Superintendent, Operations
- W. Colbert, Director, Nuclear Engineering
- *S. Noetzel, Assistant Manager, Nuclear Engineering
- *R. Bryer, Systems Engineer
- D. Spiers, General Supervisor, Nuclear Engineering
- *M. S. Williams, Engineer
- L. Collins, System Engineer
- R. Kezenius, System Engineer
- R. Anderson, System Engineer
- P. Harrigan, System Engineer
- A. K. Lim, System Engineer
- L. Wooden, System Engineer
- C. M. Heidel, President
- W. J. McCarthy Jr., Chairman and Chief Executive Officer

Stone and Webster Engineering Corporation (S&W)

- M. I. Gilman, QA Department Supervisor
- F. Canuso, Supervisor, Engineering Assurance
- *W. Chamberlain, Engineering Manager
- R. Byrnes, Vice President, Senior Engineering Manager
- *S. C. Chow, Assistant Division Manager, EMD
- G. Krishnamurthy, Section Manager
- *R. Read, Assistant Section Manager, Pipe Supports
- J. Walsh, Principal Engineer
- R. Petty, Principal Auditor, Engineering Assurance
- *R. Strych, Director, Nuclear Engineering
- *F. Ogden, Senior Mechanical Engineer, EMD

Sargent and Lundy Engineers (S&L)

- M. Tatosian, Structural Project Engineer

The inspectors also contacted and interviewed other licensee and contractor employees.

*Denotes those attending the exit meeting at the Region III office on January 23, 1986.

°Denotes those telephonically contacted on March 13, 1986, for the final exit.

2. Licensee Event Report (LER) Followup

(Open) LER (341/85082-LL): During the process of performing the final load verification on the Reactor/Auxiliary Building steel embedded plates, Sargent and Lundy discovered a number of these embedded plates were potentially overloaded based on enveloping load calculations. The corrective actions taken and the remaining action to be completed by the licensee is described in Paragraph 4 of this report.

3. Followup on Seismic Reviews

a. Background

SAFETEAAM Concern No. 694, which alleged that Nuclear Engineering had not performed seismic reviews on engineering changes, was reviewed on October 18, 1985, by the NRC Resident Inspectors and documented in RIII Inspection Reports No. 50-341/85042 and No. 50-341/85048. It was determined that a more detailed review of this matter should be performed by a regional specialist inspector. The licensee initiated Deviation/Event Report (DER) No. 85-680, dated October 14, 1985, to address the lack of seismic reviews on Nuclear Engineering generated design change documents. The licensee's evaluation of the above DER was scheduled to be completed by December 1, 1985. Thus, the special safety inspection documented in this report, did not commence until the licensee's DER evaluation process was completed.

b. Procedure Review

The inspectors' review encompassed the following documents which implement the licensee's program for preparation, review, and approval of Nuclear Engineering design change documents:

- (1) NE-3.9, "Preparation, Review, and Approval of Engineering Design Packages (EDPs)," Revision 4
- (2) NE-3.11, "Preparation, Review, and Approval Engineering Change Requests (ECRs)," Revision 2, PCN No. 1, Revision 0
- (3) NE-3.12, "As-Built Notice (ABN)," Revision 2, PCN No. 1, Revision 0, and PCN No. 2, Revision 1
- (4) NE-2.5.7, "Design Verification," Revision 1, PCN No. 1, Revision 0
- (5) NOP-106, "Design Change Program," Revision 0
- (6) NOIP-11.000.53, "10 CFR 50.59 Safety Evaluations," Revision 0, PCN No. 1, Revision 0

The current revisions of these procedures (as well as earlier revisions) require, as part of the design review process, a verification that the equipment (system) be able to perform its function under the Design Basis Earthquake (DBE). Thus, the design qualification process had always required that a seismic assessment be made during

the overall design review process. The Systems Engineer is responsible for the technical content and design verification of each design document package.

No violations or deviations were identified.

c. Interviews of Systems Engineers

The NRC inspectors interviewed six Systems Engineers independently to determine if they understood what their signatures meant on the design change cover sheets. The results of the interviews revealed that all six engineers believed that their sign-offs were attesting to the fact that all applicable reviews, as they thought necessary, had been performed. The NRC inspectors determine that, in general, Systems Engineers did not have the required knowledge to perform seismic analysis. However, they all met the licensee's qualification requirements as specified in Procedure NE-2.5.7 to be a verifier. The NRC inspectors concluded that the Systems Engineers, in some cases, may not have provided the same level of review as was applied to the original design. See paragraph 3.f for final review results.

No violations or deviations were identified.

d. Initial Review of Nuclear Engineering (NE) Change Documents

The licensee initiated Deviation/Event Report (DER) No. 85-680 on October 14, 1985, to review all NE generated change documents issued between August 1984 and August 1985 to ascertain which changes received or required seismic qualification reviews. This review was a result of an Engineering Assurance (EA) audit finding, identified during July 1985, which revealed that no evidence existed that verified seismic reviews had been performed on 27 Engineering Change Requests (ECRs). The total number of documents which required a re-review was established at 1,995 by the licensee. Giffels Associates, Incorporated (GAI), per GWA-095A dated October 28, 1985, was given the assignment to perform a review of the 1,995 potentially deficient documents for final resolution of this issue (See paragraph 3.f.).

The NRC inspectors found that the Giffels documented reviews were only of a scoping nature and not a formalized seismic evaluation or an analysis of the 1,995 change documents. The above GAI review was only to categorize and identify any changes which require additional investigation or possible hardware fixes. Giffels letter No. 85-GAI-399 dated December 2, 1985, identifies which documents require a further review by a Detroit Edison "Seismic System Engineer." Since the licensee's seismic evaluations or justifications were not completed on the changes identified in the GAI letter, the NRC inspectors informed the Director of Nuclear Engineering on December 4, 1985, that the NRC review of this issue would be completed after Detroit Edison had completed their evaluation of the engineering changes and the documentation of their seismic engineering judgments or analyses. The Director of Nuclear Engineering informed the NRC inspectors that his management was presently in the Region III office making a presentation on the status of the seismic issue (See Paragraph 3.e.).

e. Management Meeting at Region III

On December 4, 1985, the Detroit Edison Company and the NRC met in Region III to discuss the status of the ongoing engineering evaluations and the Reactor Operations Improvement Plan. Mr. Frank Agosti (DECo) made the presentation on the engineering evaluations and Mr. R. Lenart (DECo) made the presentation on the Reactor Operations Improvement Plan. During Mr. Agosti's (DECo) presentation, he indicated that all the required seismic reviews were complete. By letter dated December 12, 1985 to Mr. James G. Keppler (NRC), Mr. Agosti corrected his statement on the status of seismic reviews to indicate that only 64 of 133 evaluations were complete.

f. Final Review of Seismic Design/Qualification Reports

The licensee's seismic closure packages for the NE change documents listed in the GAI letter were delivered by the licensee to the Region III Office on December 16, 1985. The NRC inspectors found the Seismic Design/Qualification Reports for the above change documents to be seismically acceptable with the exception of SQR-2036. The licensee has since clarified their engineering judgement on the SQR form and it was found to be acceptable. The licensee's seismic review of the 1,995 change documents has revealed that no hardware modifications were required and that even though a prior seismic review may not have been explicitly documented, all safety-related systems were still capable of performing their safety function.

No violations or deviations were identified.

4. Reactor/Auxiliary Building Embedment Plates

The licensee notified the NRC Resident Inspector on December 5, 1985 that approximately forty-five embedded plates in the Reactor/Auxiliary Building were potentially overstressed due primarily from pipe hanger loads.

On December 6, 1985, the licensee subsequently decided that this deviation was potentially reportable under 10 CFR 50.72 and 10 CFR 50.73. On December 7, 1985, the licensee declared the following systems inoperable: Containment Atmosphere, Reactor Building Closed Cooling Water, Residual Heat Removal, Emergency Equipment Service Water, Emergency Equipment Cooling Water, Core Spray, and miscellaneous turbine building systems.

The potential over-stressing of embedments was due to unsophisticated analytical methods and eccentric attachment locations used in the original enveloping load capacity calculations. The overloading conditions on the embedment plates have been resolved by a combination of refinement of the hanger loads, as built attachment locations, and refined embedment analyses. Sargent and Lundy's final as-built design load verification of the embedment plates is now complete and their assessment has shown that all embed plates are qualified and have adequate structural strength to sustain the system support reactions or loads.

a. Review of Load Reduction Calculations

The NRC inspectors conducted a review of the refined hanger loads at the Stone and Webster (S&W) office in Cherry Hill, New Jersey on January 13 and 14, 1986. While conducting this review, calculational errors were found in several of the design calculations examined. The NRC inspectors determined that the deficiencies warranted a more thorough review by S&W, and requested the licensee have S&W re-review all refined load calculations and deliver them to the NRC Region III office on January 22, 1986.

After leaving the S&W office the NRC inspectors went to the Fermi 2 site to review the pipe stress report load reduction calculations. The NRC inspectors were informed that the pipe stress load reduction calculations which served as input to the S&W hanger load refinement calculations were in their Troy design office being approved. While at the Fermi 2 site on January 16 the NRC inspectors found that the licensee had declared all plant systems operable again on January 7, 1986, per DECo letter NE-86-0007. The letter states that the analysis of the Reactor Auxiliary Building embedded plates for the as-built hanger loads is complete and all of the potentially overloaded embedded plates have been resolved analytically. However, DECo's Design Calculation DC-2494, Revision A, which contains pipe stress load reductions for ten torus attached piping supports, had not been verified or approved prior to declaring all plant systems operable.

The licensee was informed that failure to assure adequate control of design activities from initiation through the final approval process is a violation of Criterion III of 10 CFR 50, Appendix B (341/85052-01).

b. S&W Hanger Load Reduction Calculation Re-Review

The S&W re-reviewed refined hanger load calculations were examined by the NRC inspectors in the Region III office on January 22 and 23, 1986. The earlier identified calculational errors and discrepancies had been resolved and all of the S&W calculations sampled during this review were determined to be acceptable. However, during the process of resolving the calculational errors and discrepancies and utilizing the latest engineering change documentation instead of the latest hanger calculations, the earlier S&W refined hanger loads increased in some cases. As a result, Sargent & Lundy had to reassess and reconcile these load increases into their final design verification of the embedded plates.

No violations or deviations were identified.

c. Sargent and Lundy's Final Load Verification of Reactor Auxiliary Building Embedded Plates

Sargent and Lundy has completed their evaluations on the embedded plates and determined that all plates are qualified to support the imposed loads. Thus, no physical hardware modifications were required.

The licensee's Assistant Manager Nuclear Engineering notified Region III on January 30, 1986, that all embedded plates have been qualified by Sargent and Lundy and no hardware modifications were required.

d. Conclusion

Even though the embedded plates are now finally design verified to account for all system support as-built imposed loads, it appears that the licensee neglected to perform this required design verification task prior to receiving an Operating License on March 20, 1985. The licensee was requested to compile additional information on this matter so it can be reviewed in more detail during a future inspection. This is an unresolved item (341/85052-02). It should also be noted that during a separate NRC inspection a new issue involving non-safety related embedments supporting safety-related cable trays was identified. See NRC Inspection Report 50-341/86005 for details.

5. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 4.d.

6. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the Region III office on January 23, 1986, and telephonically discussed the findings of the inspection with a licensee representative on March 13, 1986. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during this inspection. The licensee did not identify any such documents/processes as proprietary.